

REMARKS/ARGUMENTS

Claims 1-66 stand rejected in the outstanding Official Action. Claims 2, 3, 24, 25, 46 and 47 have been cancelled without prejudice and claims 1, 4, 5, 15, 18, 21-23, 26, 27, 37, 40, 43-45, 59, 61, 62, 65 and 66 have been amended. Accordingly, claims 1, 4-23, 26-45 and 48-66 are the only claims remaining in this application.

The Examiner's indication of acceptance of the previously submitted formal drawings is appreciated. Additionally, the Examiner's consideration of the prior art previously submitted in applicant's information disclosure statement is appreciated.

In the objection to claim 61, the Examiner correctly notes that the dependency of claim 61 should have been dependent from claim 60. The dependency of claim 61 has been corrected.

Claims 15, 21, 22, 37, 43, 44, 59, 65 and 66 stand rejected under 35 USC §112 (second paragraph) as being indefinite. In each of these claims, the word "a" has been changed to "said" to obviate the recited indefiniteness. This change in each of these claims obviates the rejection of these claims under 35 USC §112 and any further rejection thereunder is respectfully traversed.

Claims 1-14, 16, 17, 19, 20, 23-36, 38, 39, 41, 42, 45-58, 60, 61, 63 and 64 stand rejected under 35 USC §102 as being anticipated by Nicol (U.S. Patent 6,141,762). The Court of Appeals for the Federal Circuit has noted in the case of *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick*, 221 USPQ 481, 485 (Fed. Cir. 1984) that "[a]nticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, arranged as in the claim."

Thus, in order to anticipate Applicant's independent claims and claims dependent thereon, Nicol must teach all limitations set out in Applicant's independent claims. Independent claims 1,

23 and 45 have all been amended to include the feature that the clock speed controller is responsive to a "detected level of parallelism" between respective streams of currently executing program instructions to "dynamically select said clock signal for use in future processing." Thus, the claimed invention utilizes the detected degree of parallelism for currently executing program instructions in order to select the clock signal for use in future processing.

In Nicol, there is an assumption that the number of instructions that need to be executed is already known and is made available to the operating system. ("The number of instructions that need to be executed for each task is known and made available to the operating system." Column 3, line 13). In Nicol, the operating system then uses this information to balance the tasks across the processors so that performance can be reduced and energy saved. The determination as to how a series of program instructions are to be executed and the manner in which it is divided between processors is carried out in advance of the execution of those tasks.

Thus, Nicol subdivides the workload in advance. While theoretically attractive, in practice, such subdivision is an extremely difficult programming challenge. In effect, Nicol attempts to determine in advance the parallelism that will be achieved for a particular block of code before that code is being executed. Unfortunately, in practice, the degree of parallelism is very often data dependent and accordingly irregular to an extent by which it cannot be accurately determined in advance.

The presently claimed invention uses a feedback mechanism in which the clock speed controller is responsive to the degree of actual detected parallelism for the currently executed program instructions in order to dynamically set a clock speed for use in future processing. One might think that the technique of the present invention would be inferior to that of Nicol, since it

is using actual past behavior as an indicator of future behavior, rather than seeking to analyze the code in advance and then predicting behavior based upon that yet to be executed code. However, the present invention has significant advantages over the Nicol invention.

The present invention technique is considerably simpler to implement in that an analysis and subdivision of the workload does not have to be done in advance. The presently claimed invention is also much more flexible (from a commercial point of view) as very little prior knowledge is needed of programs to be executed. Thus, the present invention provides a high degree of general applicability.

Furthermore, a practical advantage of the present invention is that the power management technique can be independent from the scheduling technique. The present technique merely requires observation of the degree of parallelism for code being currently executed and uses this parallelism to predict the clock speed necessary for future processing. As set out in all of Applicant's independent claims, the clock speeds are varied based upon a detected level of parallelism in the currently executing program instructions, but can only influence future processing. Applicant has found that the detection of current parallelism is a good predictor of future parallelism. However, the dynamic nature of control of the selection of clock signals permits system recovery if the prediction has been inaccurate.

As a result of the above, the present invention is simply totally different from that disclosed in the Nicol patent. Because Applicant has positively recited structure -- the clock speed controller which detects the level of parallelism and then dynamically selects the clock signal for use in future processing -- it clearly distinguishes away from the Nicol reference. Any

further rejection of independent claims 1, 23 and 45 or claims dependent thereon based upon the Nicol reference is respectfully traversed.

Claims 15, 18, 21, 22, 37, 40, 43, 44, 59, 62, 65 and 66 stand rejected under 35 USC §103 as unpatentable over Nicol in view of Beard (U.S. Patent 5,627,412). Inasmuch as this obviousness rejection incorporates the Nicol reference previously discussed above, the above points distinguishing Nicol from Applicant's independent claims are herein incorporated by reference.

Having previously noted that Nicol fails to teach detecting parallelism between currently executing program instructions and using this detection to dynamically select the clock signal for use in future processing, the first question is whether this structure is shown or rendered obvious in the newly cited Beard reference. The Examiner makes no allegation that Beard has any parallelism detection nor has any dynamic control of clock signal based upon such detection been suggested. Should the Examiner believe otherwise, he is respectfully requested to identify where or how the Beard reference contains any such disclosure.

Absent any disclosure, neither Nicol nor Beard contain a disclosure of subject matter positively recited in Applicant's independent claims and therefore this structure cannot be considered obvious, even if Nicol and Beard were combined.

Moreover, the Examiner has identified no reason or motivation for combining the Nicol and Beard references, save for his conclusory statement that "it would have been obvious to one of ordinary skill in the art to combine the teachings of Nicol et al, and Beard." (Official Action, page 9). Thus, even if one of Nicol and Beard did contain the missing teaching of parallelism

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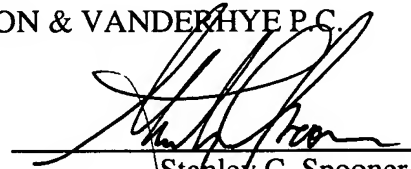
level detection and suggested using that to dynamically select the future clock signal, there would be no "reason" or "motivation" to combine these two references.

Having responded to all objections and rejections set forth in the outstanding Official Action, it is submitted that remaining claims 1, 4-23, 26-45 and 48-66 are in condition for allowance and notice to that effect is respectfully solicited. In the event the Examiner is of the opinion that a brief telephone or personal interview will facilitate allowance of one or more of the above claims, he is respectfully requested to contact Applicant's undersigned representative.

Respectfully submitted,

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